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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/597,780	06/20/2000	Alessandro Cesare Callegari	YOR-9-2000-0010	6159

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EXAMINER	
NGUYEN, HOAN C	
ART UNIT	PAPER NUMBER
2871	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/597,780	CALLEGARI ET AL.	
	Examiner	Art Unit	
	HOAN C. NGUYEN	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 September 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9,11-13,37 and 40-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9,11-13,37 and 40-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/14/2007 has been entered.

In last responses filed on 03/26/2007 and 11/20/2006, the features of "the first particle beam treatment" and "second particle beam treatment" cause the confusion between the following two interpretations:

(1) The treatment with first particle beam and the treatment with second particle beam, wherein the first particle is different from the second particle. In the last office actions, examiner mentioned that there is no disclosure for two different particles in the treatments in different directions. Therefore, the interpretation of "two different particles in the treatments in different directions" is not correct.

(2) "the first particle beam treatment" is **first treatment with particle beam** and "second particle beam treatment" is **second treatment with particle beam**, wherein the first treatment and second treatment are in different direction with same particle beam.

In order to clarify the subject matter rejection, examiner repeatedly interprets "the first particle beam treatment" and "second particle beam treatment" in claims 9 and 37 as "the first treatment of particle beam" and "the second treatment of particle beam". Therefore, the first treatment and the second treatment in different directions may use the same (or single) particle beam.

Callergari et al. disclose (col. 6 lines 12-31);

> Referring to FIG. 9, there is provided an atomic beam alignment device 948 for aligning an atomic structure of an alignment film (e.g., hydrogenated DLG film) in at least one desired direction or orientation through the use of ion radiation. As is generally understood the alignment film serves to orient the direction of the liquid-crystal. That is, when a liquid cell is formed, the molecules of the liquid-crystal align along the direction(s) provided by the atomic structure of the alignment films. Accordingly, atomic beam 948 can be used to radiate ions at the alignment film to disturb (i.e., to break bonds) and align the atomic structure of the alignment film in a desired direction or orientation, such as in a horizontal, unidirectional or multidirectional manner. A mask with features etched into it can also be used to selectively align a local area, thus leading to the fabrication of domains of alignment. These can then be used to fabricate a multidomain display, which has vastly superior viewing attributes. For multidirectional alignment, it is preferred that the multidirections are selected in such a fashion that results in a multidomain device.

Atomic beam radiate ions in multidirectional manner; therefore, same particles/ions radiate in different directions (multidirectional manner).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 9, 11-13 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oh et al. (US6665036B2) in view of Kim et al. (US006111627A), Hiroshi (US5995186A), and Callegari et al. (US6061114A).

In regard to claims 9 and 37, Oh et al. teach (Fig. 3A-B) a multi-domain liquid crystal display comprising

- a bottom substrate 210 having a first surface;
- a transparent conductive layer (data electrodes 208 and common electrode 209, thin film transistors and other display circuitry in bottom substrate to form the in-plane switching mode) disposed over said first surface of said bottom substrate.
- a top substrate 211 having a second surface;
- a color filter layer (color filter 229) disposed over a surface of the top substrate;
- a transparent conductive layer 118 disposed over said color filter;
- a first alignment layer 223a over said first transparent conductive layer
- a second alignment layer 223b made of over said second surface; said second alignment layer being spaced adjacent to and facing said first alignment layer;
- a liquid crystal material 230 disposed in the space therebetween;

wherein

However, Oh et al. fail to disclose

(a) a second transparent conductive layer disposed over the color filter;

(b) a plurality of uniformly sized spacer 108 distributing within said space;

(c) the alignment layers made of the dry deposited layers, which are made of material selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide (SiC), silicon dioxide (SiO_2), glass, silicon nitride (Si_3N_4), alumina (Al_2O_3), cerium(IV) oxide (CeO_2), tin oxide (SnO_2), zinc titanate ($ZnTiO_2$) and a combination thereof;

(d) each of said first alignment layer and said second alignment layer made of the dry deposited layers is divided into a plurality of pixels each having a boundary and at least two domains; wherein each of said multi-domain, dry deposited layers is obtained by a mechanical mask; said dry deposited layers are exposed to at least a first particle (ion) beam treatment and a second particle (ion) beam treatment, where a first particle beam and a second particle beam use the same ion, which is selected from the group consisting argon, nitrogen, oxygen and a mixture thereof; and a direction of said first particle beam treatment with respect to said dry deposited layer is different than a direction of said second particle beam treatment with respect to said dry deposited layer.

Kim et al. teach (Fig.4) (a) a second transparent conductive layer disposed over the color filter, which is formed on the surface of upper substrate; this second transparent conductive layer used for preventing electrostatics forming on the upper substrate (col. 3 lines 1-3). Kim also discloses the alignment layers 44 and 28.

Hiroshi teaches (Fig. 5) (b) a plurality of uniformly sized spacer 108 distributing within said space for supporting the thickness of liquid crystal layer (col. 5 lines 25-29).

Callegari et al. teach

(c) the alignment layers made of the dry deposited layers, which are made of material selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide (SiC), silicon dioxide (SiO_2), glass, silicon nitride (Si_3N_4), alumina (Al_2O_3), cerium(IV) oxide (CeO_2), tin oxide (SnO_2), zinc titanate ($ZnTiO_2$) and a combination thereof for requiring fewer steps and less cost to manufacture (col. 3 lines 51-58);

(d) each of said first alignment layer and said second alignment layer made of the dry deposited layers is divided into a plurality of pixels each having a boundary and at least two domains; wherein each of said multi-domain, dry deposited layers is obtained by a mechanical mask 966; said dry deposited layers are exposed to at least a first particle (ion) beam and a second particle (ion) beam, where a first particle beam treatment and a second particle beam treatment use the same ion, which is selected from the group consisting argon, nitrogen, oxygen and a mixture thereof; and a direction of said first particle beam treatment with respect to said dry deposited layer is different than a direction of said second particle beam treatment with respect to said dry deposited layer with the features of claim 11 for resulting multidomain device so that attributing large view angle (col. 6 lines 19-31).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a multi-domain liquid crystal display as Oh et al. disclosed with (a) a second transparent conductive layer disposed over the

color filter, which is formed on the surface of upper substrate; this second transparent conductive layer used for preventing electrostatics forming on the upper substrate (col. 3 lines 1-3) as taught by Kim et al.; (b) a plurality of uniformly sized spacer 108 distributing within said space for supporting the thickness of liquid crystal layer (col. 5 lines 25-29) as taught by Hiroshi; (c) the alignment layers made of the dry deposited layers, which are made of material selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide (SiC), silicon dioxide (SiO_2), glass, silicon nitride (Si_3N_4), alumina (Al_2O_3), cerium(IV) oxide (CeO_2), tin oxide (SnO_2), zinc titanate ($ZnTiO_2$) and a combination thereof for requiring fewer steps and less cost to manufacture (col. 3 lines 51-58); (d) each of said first alignment layer and said second alignment layer made of the dry deposited layers is divided into a plurality of pixels each having a boundary and at least two domains; wherein each of said multi-domain, dry deposited layers is obtained by a mechanical mask 966; said dry deposited layers are exposed to at least a first particle (ion) beam and a second particle (ion) beam, where a first particle beam treatment and a second particle beam treatment use the same ion, which is selected from the group consisting argon, nitrogen, oxygen and a mixture thereof; and a direction of said first particle beam treatment with respect to said dry deposited layer is different than a direction of said second particle treatment beam for resulting multidomain device so that attributing large view angle (col. 6 lines 19-31) with (1) non-contact alignment, (2) low energy, (3) large area uniform and parallel beam, (4) atomic beam being used to align both surfaces (col. 3 lines 25-40).

Claims 9, 11-13, 37, 41 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oh et al. (US6665036B2) in view of Kim et al. (US006111627A), Hiroshi (US5995186A), Callegari et al. (US6061114A) and **Masaaki et al. (JP08-101390)**.

In regard to claims 9 and 37, Oh et al. teach (Fig. 3A-B) a multi-domain liquid crystal display comprising

- a bottom substrate 210 having a first surface;
- a transparent conductive layer (data electrodes 208 and common electrode 209, thin film transistors and other display circuitry in bottom substrate to form the in-plane switching mode) disposed over said first surface of said bottom substrate.
- a top substrate 211 having a second surface;
- a color filter layer (color filter 229) disposed over a surface of the top substrate;
- a transparent conductive layer 118 disposed over said color filter;
- a first alignment layer 223a over said first transparent conductive layer
- a second alignment layer 223b made of over said second surface; said second alignment layer being spaced adjacent to and facing said first alignment layer;
- a liquid crystal material 230 disposed in the space therebetween;

wherein

However, Oh et al. fail to disclose

(a) a second transparent conductive layer disposed over the color filter;

(b) a plurality of uniformly sized spacer 108 distributing within said space;

(c) the alignment layers made of the dry deposited layers, which are made of material selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide (SiC), silicon dioxide (SiO_2), glass, silicon nitride (Si_3N_4), alumina (Al_2O_3), cerium(IV) oxide (CeO_2), tin oxide (SnO_2), zinc titanate ($ZnTiO_2$) and a combination thereof;

(d) each of said first alignment layer and said second alignment layer made of the dry deposited layers is divided into a plurality of pixels each having a boundary and at least two domains; wherein each of said multi-domain, dry deposited layers is obtained by a mechanical mask; said dry deposited layers are exposed to at least a first particle (ion) beam treatment and a second particle (ion) beam treatment, where a first particle beam and a second particle beam use the same ion, which is selected from the group consisting argon, nitrogen, oxygen and a mixture thereof; and a direction of said first particle beam treatment with respect to said dry deposited layer is different than a direction of said second particle beam treatment with respect to said dry deposited layer as claims 11, 41 and 43.

Kim et al. teach (Fig.4)

(a) a second transparent conductive layer disposed over the color filter, which is formed on the surface of upper substrate; this second transparent conductive layer used for preventing electrostatics forming on the upper substrate (col. 3 lines 1-3). Kim also discloses the alignment layers 44 and 28.

Hiroshi teaches (Fig. 5)

(b) a plurality of uniformly sized spacer 108 distributing within said space for supporting the thickness of liquid crystal layer (col. 5 lines 25-29).

Callegari et al. teach

(c) the alignment layers made of the dry deposited layers, which are made of material selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide (SiC), silicon dioxide (SiO_2), glass, silicon nitride (Si_3N_4), alumina (Al_2O_3), cerium(IV) oxide (CeO_2), tin oxide (SnO_2), zinc titanate ($ZnTiO_2$) and a combination thereof for requiring fewer steps and less cost to manufacture (col. 3 lines 51-58);

Masaaki et al. (JP08-101390) teach

(d) each of said first alignment layer and said second alignment layer made of the dry deposited layers is divided into a plurality of pixels each having a boundary and at least two domains; wherein each of said multi-domain, deposited layer is obtained by a mask; said dry deposited layers are exposed to at least a first particle (ion) beam and a second particle (ion) beam; and a direction of said first particle beam treatment with respect to said deposited layer is different than a direction of said second particle beam treatment with respect to said deposited layer with the features of claim 11, 41 and 43 for excellent visual angle characteristic and capable of making high-grade display (abstract).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a multi-domain liquid crystal display

as Oh et al. disclosed with (a) a second transparent conductive layer disposed over the color filter, which is formed on the surface of upper substrate; this second transparent conductive layer used for preventing electrostatics forming on the upper substrate (col. 3 lines 1-3) as taught by Kim et al.; (b) a plurality of uniformly sized spacer 108 distributing within said space for supporting the thickness of liquid crystal layer (col. 5 lines 25-29) as taught by Hiroshi; (c) the alignment layers made of the dry deposited layers, which are made of material selected from the group consisting of hydrogenated diamond-like carbon, amorphous hydrogenated silicon, silicon carbide (SiC), silicon dioxide (SiO_2), glass, silicon nitride (Si_3N_4), alumina (Al_2O_3), cerium(IV) oxide (CeO_2), tin oxide (SnO_2), zinc titanate ($ZnTiO_2$) and a combination thereof for requiring fewer steps and less cost to manufacture (col. 3 lines 51-58) as Callegari et al. taught; (d) each of said first alignment layer and said second alignment layer made of the deposited layers is divided into a plurality of pixels each having a boundary and at least two domains; wherein each of said multi-domain, deposited layers is obtained by a mask; said deposited layers are exposed to at least a first particle (ion) beam and a second particle (ion) beam; and a direction of said first particle beam treatment with respect to said dry deposited layer is different than a direction of said second particle treatment beam with the features of claim 11 and 41-44 for excellent visual angle characteristic and capable of making high-grade display (abstract) as **Masaaki et al. taught**.

Claims 40-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oh et al. (US6665036B2) in view of Kim et al. (US006111627A), Hiroshi (US5995186A),

and Callegari et al. (US6061114A) as applied to claims 9, 11-13, 37 and 40 in further view of Chaudhari et al. (US6124914A).

Oh et al. (US6665036B2) fail to disclose said first particle beam treatment aligns first and second ones of the domains of at least one of said pixels in a first direction, and wherein said second particle beam treatment aligns said first domain in a second direction as cited in claims 40-44.

Chaudhari et al. disclose the particle beam treatment overwrites said first direction of said first domain with said second direction (col. 5 lines 2-26 and 58-63), wherein the first particle beam treatment aligns first and second ones of the domains of at least one of said pixels in a first direction, and second particle beam treatment aligns said first domain in a second direction; with mechanical mask, Fig. 9A-B shows the first particle beam treatment aligns the alignment layer in one direction of surface 84 and the second particle beam treatment aligns said first domain in a second direction of surface 82 for pattering alignment direction on an alignment surface from more then one direction.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a multi-domain liquid crystal display as Oh et al. disclosed with the particle beam treatment overwrites said first direction of said first domain with said second direction (col. 5 lines 2-26 and 58-63), wherein the

first particle beam treatment aligns first and second ones of the domains of at least one of said pixels in a first direction, and second particle beam treatment aligns said first domain in a second direction; with mechanical mask, Fig. 9A-B shows the first particle beam treatment aligns the alignment layer in one direction of surface 84 and the second particle beam treatment aligns said first domain in a second direction of surface 82 for pattering alignment direction on an alignment surface from more then one direction (col. 3 lines 12-15) as Chaudhari et al. taught.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOAN C. NGUYEN whose telephone number is (571) 272-2296. The examiner can normally be reached on MONDAY-THURSDAY:8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HOAN C. NGUYEN
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ANDREW SCHECHTER
PRIMARY EXAMINER